

Integrated Energy Policy Report Committee and Climate Change Advisory Committee

July 12, 2005



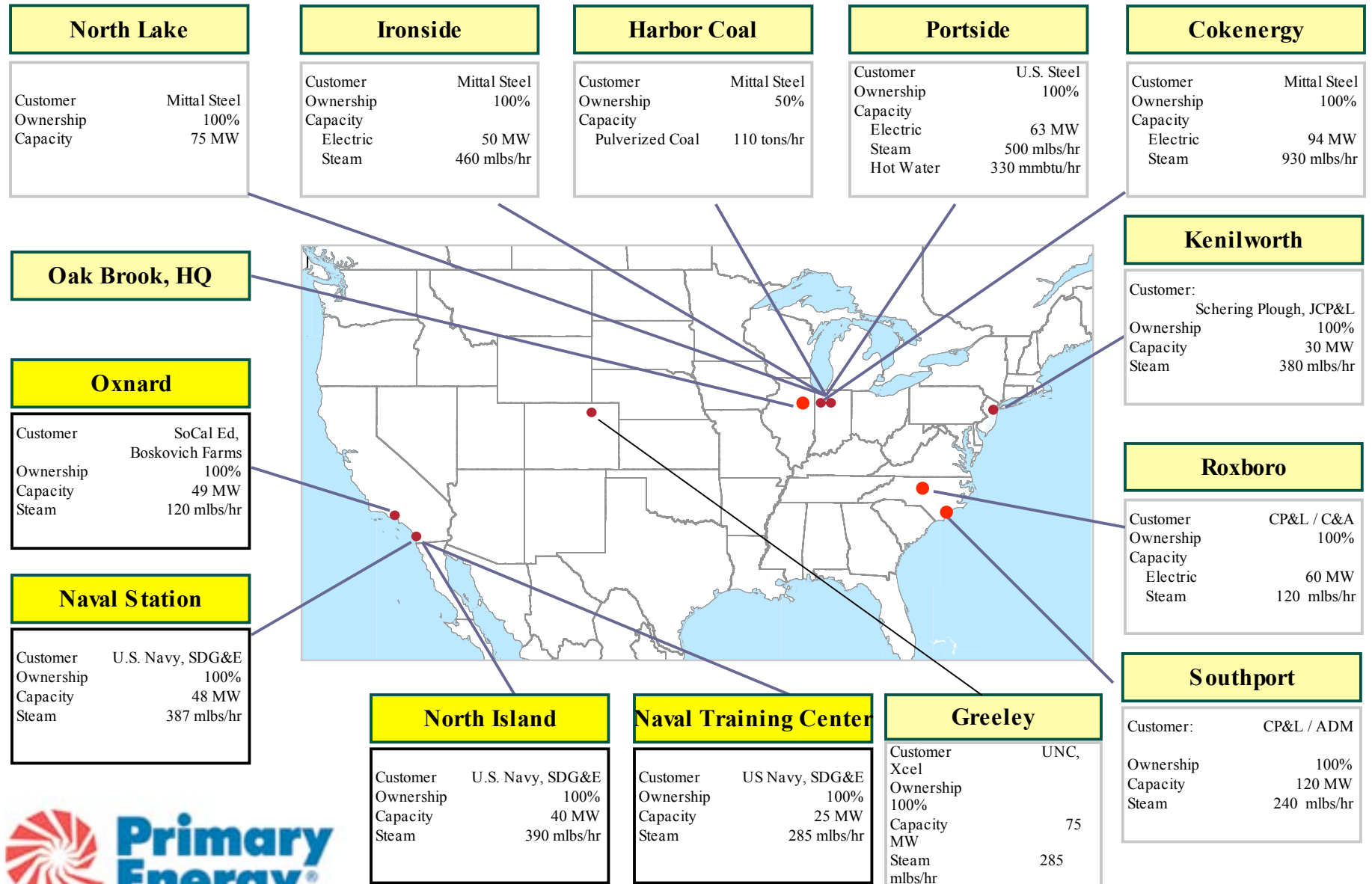
Increasing California's Energy Efficiency: Recycled Energy and CHP

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Primary Energy Overview



Overview

California wants:

1. A reliable electric system
2. A more competitive economy and ability to retain good, in-state jobs
3. A cleaner environment with less pollution and reduced GHG emissions

Recycled Energy (RE) meets these goals...



What is Recycled Energy (RE)?

Recycled Energy

- Substitutes knowledge and capital for fuel, making productive use of another's waste energy
- Takes advantage of waste energy through:
 - Waste Heat Recovery
 - Capture and combustion of off-gases
 - Capture and use of pressure changes
- And uses it to generate electricity, steam, or chilling
- ... *Really just increasing energy efficiency*

California Wants:

1. A Reliable Electric System

Recycled Energy:

- Creates more supply with no additional fuel
- Is always distributed generation, so reduces grid congestion
- Provides greater energy security because generation is dispersed
- Is not intermittent (reserve capacity not needed)
- Minimizes T&D losses, expansion, and investment
- Can provide backup power to the grid in emergencies



California Wants:

2. A More Competitive Economy

Recycled Energy:

- Generates more power with no additional fuel
- Reduces fuel demand and lowers peak power loads, reducing costs for everyone
- Improves industrial competitiveness through lower energy costs
- Hosts are typically manufacturers with good high-paying jobs
- Helping the manufacturing core in turn helps to retain surrounding businesses



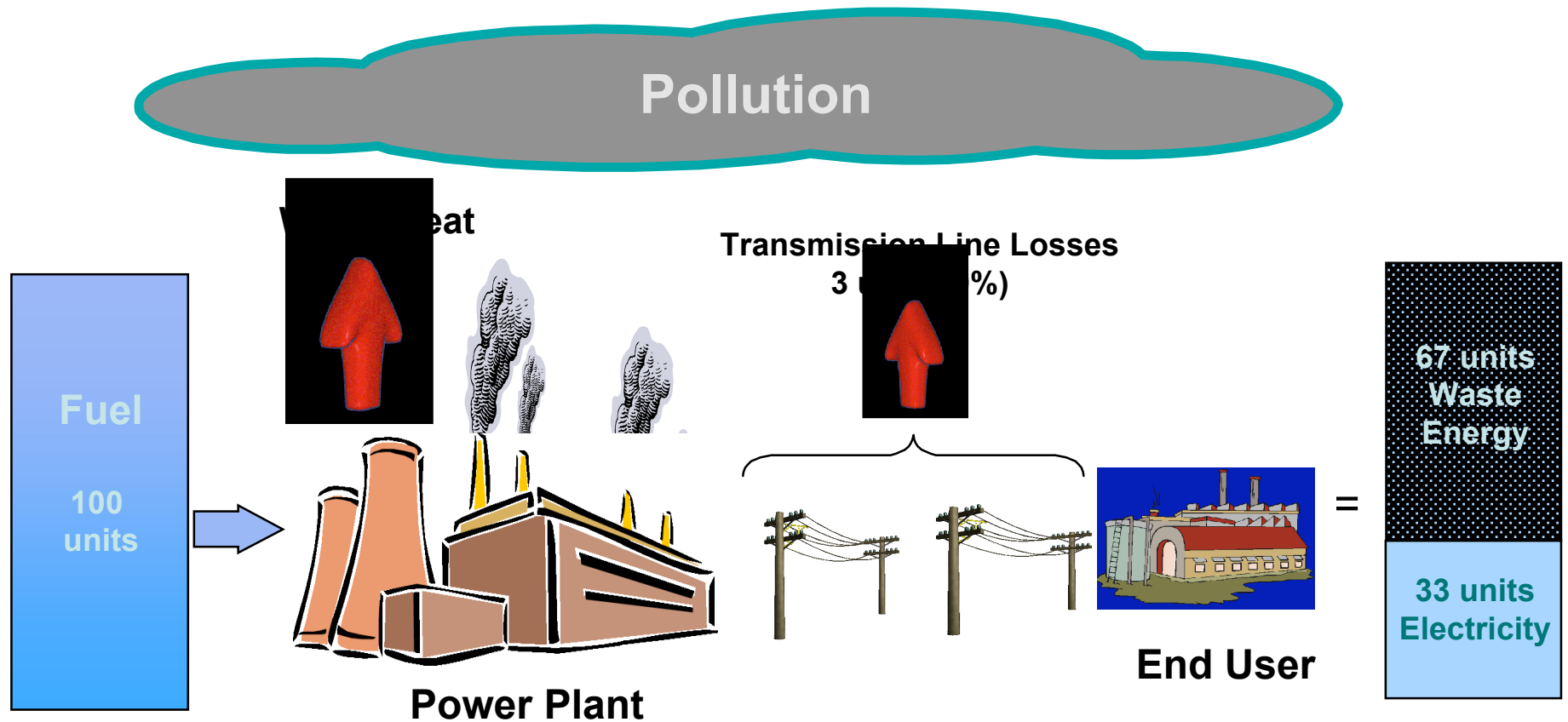
California Wants:

3. A Cleaner Environment and Lower GHG Emissions

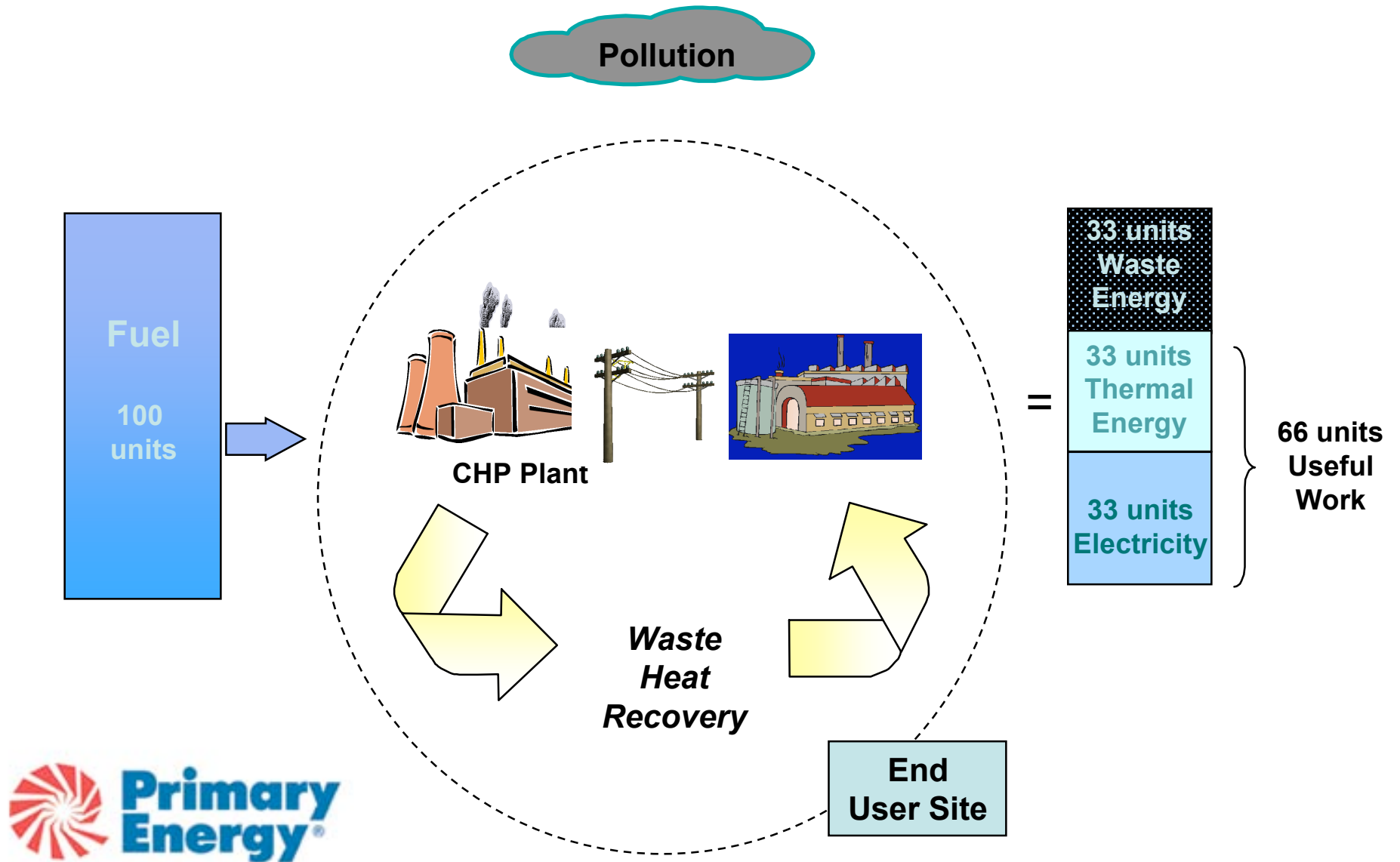
Recycled Energy:

- Squeezes more work out of fossil fuels being consumed
- Creates no additional emissions
- Requires less “single-use” central generation, reducing corresponding emissions
- Reduces generation needed to compensate for line losses (and its fuel costs & emissions)

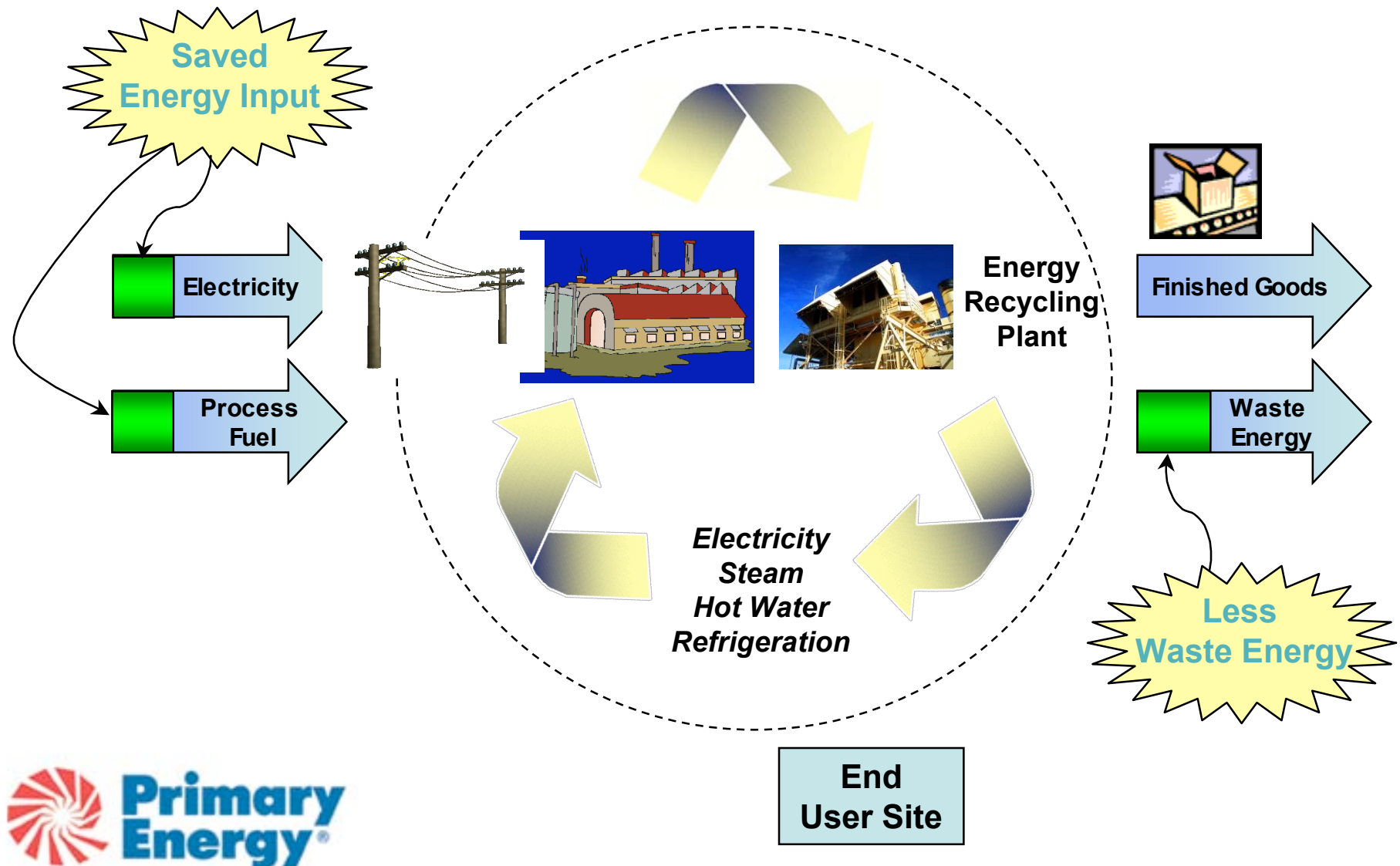
Historical Approach to Generation: Conventional Central Station



California's Best Efficiency Improvement: Recycled Energy / Combined Heat & Power



Recycled Energy Options



CO₂ Emissions & Energy Policies

$$\begin{array}{|c|} \hline \text{CO}_2 \\ \text{Emissions} \\ \hline \end{array} = \begin{array}{|c|} \hline \text{Carbon} \\ \text{Content} \\ \text{of Fuel} \\ \hline \end{array} \times \begin{array}{|c|} \hline \text{Amount of} \\ \text{Fuel Used} \\ \hline \end{array}$$

Focus: Renewables *Focus: Efficiency*

- California has worked hard to reduce Carbon Content
 - RPS, Supplemental Energy Payments, Loading Order, etc.
- But what have we done to reduce the Fuel Used?
- We should adopt an *Energy Efficiency Portfolio Standard* or other *RPS-like requirements* to reduce the Amount of Fuel Used through measures like RE?

Does California have RE potential? YES!

- Across many industries (glass, chemicals, refining, food processing, industrial boilers, electricity, etc.)
 - Waste Heat Recovery & Industrial Off-gases (EPA) – **961 MW**
 - Pressure Drops / NG Expanders (EPA) – **124 MW**
 - Oil Production (pumping) (COPE) – **400-600 MW**
 - *Understated due to little reporting outside power plants*
- 1600 MW of RE would offset CA power sector emissions:
 - **CO₂: ~ 6.6%** **NO_x: ~ 6.5%;**
 - **SO₂: ~6.5%** **Mercury: ~3.2%**

(Almost 3 times more if offsetting out-of-state coal power)
- RE could achieve **~8% of CA's 2010 GHG target alone!**



Why Aren't We Doing More RE Now?

- **Optimal Choices Blocked by “Conventional Wisdom”:**
 - “All power must flow through wires”
 - “Central generation provides economies of scale”
 - “Exit fee burdens are created by new technologies”
 - “Fixed costs increase for remaining customers”
 - Despite state-wide load growth?
- **Often Manifest as Regulatory Obstacles**
 - No Standard Offer Contracts
 - Punitive Standby Rates
 - Exit Fees
 - Discount rate retention deals
 - No incentives/requirements for efficiency like for renewables (e.g., RPS or SEPs)
- *Result: Management focuses on core business, not readily available energy opportunities*



California Has a Win/Win Leadership Opportunity

- **Modest energy policy changes can induce optimal choices:**
 - Lowering energy costs, fossil fuel use, and emissions
 - Increasing energy security and manufacturing competitiveness
- **Changes should include:**
 - End of central generation as the default paradigm
 - Modernize obsolete rules that create barriers to efficiency
 - Fix environmental rules to reward efficiency
 - Reward all players for efficiency



What Should CEC, CPUC and CalEPA do?

- *“Avoiding high costs later requires accounting for CO2 in current investment decisions and technology choices.”*

The U.S. Electric Power Sector and Climate Change Mitigation,
Pew Center on Global Climate Change, June 2005

- History proves mandates are needed to drive innovation and technology development...
- So, we need an “energy efficiency mandate”
- Don’t pick technologies, but create the obligation
- Incorporate incentives, like factoring efficiency into Loading Order
- Reinstate Standard Offers to help in financing



Bottom Line:

RE and CHP Can Bring Immediate Benefits to California

- More power with less fuel
- Cleanest power possible – *no incremental emissions*
- Distributed for greater reliability and energy security
- Non-Intermittent energy supply
- Little T&D investment; minimal line losses
- Makes California manufacturers more competitive
- And importantly, no unintended consequences!
 - California's innovative energy policies have sometimes produced *unintended results*...
 - But more RE and CHP just makes California more efficient

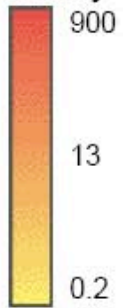


Thank you for listening!



New Heat Recovery data

Sum of Power Available from
Heat Recovery (MW) by
County



Pushpins

 US stack info small file new



Recycled Energy Case Study: Primary Energy

- We invested \$300 million to recycle blast furnace and coke oven exhaust in four steel plants, creating:
 - 440 megawatts of electric capacity
 - 1.8 million pounds/hour of steam capacity
- Steel mills save over **\$100 million per year**
- Primary Energy makes a fair return on capital
- CO₂ reduction is equivalent to one million acres of new trees.



Primary Energy's View of The Future
90 MW Recycled from Coke Production



Capital Costs per Kilowatt: Central vs. Decentralized Generation

	Generation	Transmission & Distribution	Total / kW of Generation	KW required/ kW Load	Total costs/ kW New Load
Conventional Central Generation	\$890	\$1380	\$2,270	1.52	\$3,450
Decentralized Generation	\$1,200	\$138	\$1,338	1.07	\$1,432
Savings (Loss) of Local vs Central Generation	(\$310)	\$1,242	\$1,068	0.47	\$2,018
% of Central Generation	(34%)	90%	47%		59%